

REMARKS

Reconsideration of this application is respectfully requested in view of the foregoing amendment and the following remarks.

By the foregoing amendment, claim 1 has been amended and claims 2 and 7 have been canceled. Claims 3, 6 and 8, were canceled in a previous amendment. Thus, claims 1, 4 and 5 are currently pending in the application and subject to examination.

Formal Matters

In the Office Action mailed July 14, 2005, claims 2 and 7 were objected to under 37 C.F.R. § 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. Claims 2 and 7 have been canceled, thereby rendering this objection moot.

Claims 1, 2, 4, 5 and 7 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 2 and 7 have been canceled and claim 1 has been amended responsive to this rejection. If any further amendment is necessary to overcome this rejection, the Examiner is requested to contact the Applicant's undersigned representative.

Asserted Rejections Under 35 USC § 103

In the outstanding Office Action, claims 1, 2, 4, 5 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Patent Publication No. JP 11-307791 (hereinafter "JP '791") in view of Yamagishi et al. (U.S. Patent No. 6,300,556, hereinafter "Yamagishi"), Green et al. (U.S. Patent

No. 5,942,050, hereinafter "Green"), Brandhorst, Jr. (U.S. Patent No. 4,131,486, hereinafter "Brandhorst") and Spitzer (U.S. Patent No. 4,667,060, hereinafter "Spitzer"). Claims 1, 2, 4, 5 and 7 were also rejected under 35 U.S.C. § 103(a) as being unpatentable over Hanoka et al. (U.S. Patent No. 6,353,042, hereinafter "Hanoka") in view of Yamagishi, JP '791, Green, Brandhorst and Spitzer. It is noted that claims 2 and 7 have been canceled, and claim 1 has been amended. To the extent that these rejections apply to the claims currently pending, the Applicant hereby traverses the rejections, as follows.

Claim 1, as amended, recites, in part:

each of said plurality of solar cell elements includes

an n-type crystalline silicon substrate,

an intrinsic amorphous silicon layer, a p-type amorphous silicon layer, a transparent electrode, and a collector electrode formed on a surface of the n-type crystalline silicon substrate in this order, and

an intrinsic amorphous silicon layer, an n-type amorphous silicon layer, a transparent electrode, and a collector electrode formed on an opposite surface of the n-type silicon substrate in this order;

the light incidence side light transmitting member is adhered at the side of the n-type amorphous silicon layer of the plurality of solar cell elements by interposing the sealing resin;

the rear surface member is adhered at the side of the p-type amorphous silicon layer of the plurality of solar cell elements by interposing the sealing resin;

wherein the solar cell element has a p-n junction formed between a p-type or n-type crystalline silicon substrate and an n-type or p-type thin film amorphous semiconductor layer;

each said thin film amorphous semiconductor layer which forms the p-n junction with said crystalline silicon substrate is positioned opposite the light incidence side light transmitting member by interposing the crystalline silicon substrate therebetween; and

the light incidence side light transmitting member is positioned at a principal light incidence side.

In the claimed invention, a light incidence side light transmitting member made of glass is adhered at a side of an n-type amorphous silicon layer, and the rear surface member is adhered at a side of a p-type amorphous silicon layer, as shown, for example, in Fig. 2 of the subject application. The claimed structure provides improved resistance to moisture.

JP '791 discloses in Fig. 1 a solar cell module formed of a plurality of solar cells 1, which is sealed with a sealing resin between a front surface side glass plate 3 and a rear surface side resin film 4. The solar cell 1, as shown in Fig. 2 of JP '791, includes a p-type amorphous silicon layer 13 formed on the front surface side of an n-type crystalline silicon substrate 11 and an n-type amorphous silicon layer 17 formed on the rear surface side of the n-type crystalline silicon substrate 11. A light incidence side light transmitting member (glass plate 3) is adhered at a side of the p-type amorphous silicon layer 13, and a rear surface member (light transmitting sheet 4) is adhered at a side of the n-type amorphous silicon layer 17. The solar cell 1 of JP '791 is sandwiched between the front surface side glass plate 3 and the rear surface side resin film 4, so that the p-type amorphous silicon layer 13 is positioned at the front surface side glass plate 3. At paragraph [0024], JP '791 discloses "[o]n one principal plane (front face) of the crystal system silicon substrate 11, the laminating of the i type amorphous silicon layer 12 and the p type amorphous silicon layer 13 is carried out to [sic] this order," emphasis added. Thus, JP '791 clearly discloses the glass plate 3 being formed

on the surface side of module on which the p-type amorphous silicon layer 13 is formed. JP '791 further discloses in paragraph [0026] that the incident light "is carried out to the field to which the solar-battery cell 1 exists through a glass plate 3 from a modular front-face side...into the solar-battery cell 1," emphasis added. Thus, JP '791 discloses that light incident through the glass plate 3 enters the solar cell 1 from the front surface side thereof, which is the side having the p-type amorphous silicon layer 13 formed thereon. Moreover, throughout the specification, JP '791 refers to the side of the module on which the glass plate 3 and the p-type amorphous silicon layer 13 are disposed as "the surface side of the module," and to the side of the module on which the light-transmitting sheet 4 is disposed as "the backside of the module." See, e.g., JP '791, paragraph [0024]. Thus, JP '791 discloses the light incidence side light transmitting member (glass plate 3) being adhered at the side of the p-type amorphous silicon layer 13, and the rear surface member (light transmitting sheet 4) being adhered at the side of the n-type amorphous silicon layer 17 (Fig. 2).

As noted above, in the claimed invention, the light incidence side light transmitting member made of glass is adhered at the side of the n-type amorphous silicon layer and the rear surface member is adhered at the side of the p-type amorphous silicon layer. Thus, the Applicant submits that JP '791 fails to disclose or suggest each and every feature recited in claim 1. Specifically, the Applicant submits that JP '791 neither discloses nor suggests at least the combination of features wherein each of said plurality of solar cell elements includes an n-type crystalline silicon substrate, an intrinsic amorphous silicon

layer, a p-type amorphous silicon layer, a transparent electrode, and a collector electrode formed on a surface of the n-type crystalline silicon substrate in this order, and an intrinsic amorphous silicon layer, an n-type amorphous silicon layer, a transparent electrode, and a collector electrode formed on an opposite surface of the n-type silicon substrate in this order; the light incidence side light transmitting member is adhered at the side of the n-type amorphous silicon layer of the plurality of solar cell elements by interposing the sealing resin; the rear surface member is adhered at the side of the p-type amorphous silicon layer of the plurality of solar cell elements by interposing the sealing resin, as recited in claim 1, as amended.

In addition, the Applicant submits that none of the cited prior art, nor combination thereof, discloses or suggests at least the combination of features wherein said plurality of solar cell elements includes an n-type crystalline silicon substrate, an intrinsic amorphous silicon layer, a p-type amorphous silicon layer, a transparent electrode, and a collector electrode formed on a surface of the n-type crystalline silicon substrate in this order, and an intrinsic amorphous silicon layer, an n-type amorphous silicon layer, a transparent electrode, and a collector electrode formed on an opposite surface of the n-type silicon substrate in this order; the light incidence side light transmitting member is adhered at the side of the n-type amorphous silicon layer of the plurality of solar cell elements by interposing the sealing resin; the rear surface member is adhered at the side of the p-type amorphous silicon layer of the plurality of solar cell elements by interposing the sealing resin; wherein the solar cell element has a p-n junction

formed between a p-type or n-type crystalline silicon substrate and an n-type or p-type thin film amorphous semiconductor layer; each said thin film amorphous semiconductor layer which forms the p-n junction with said crystalline silicon substrate is positioned opposite the light incidence side light transmitting member by interposing the crystalline silicon substrate therebetween; and the light incidence side light transmitting member is positioned at a principal light incidence side, as recited in claim 1, as amended.

For at least these reasons, the Applicant submits that claim 1, as amended, is allowable over the cited prior art. As claim 1 is allowable over the cited prior art, the Applicant submits that claims 4-5, which depend from allowable claim 1, are likewise allowable over the cited prior art.

Asserted Double Patenting Rejection

Claims 1, 2, 4, 5 and 7 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 of U.S. Patent No. 6,818,819 in view of JP '791, Green, Brandhorst and Spitzer. In addition, claims 1, 2, 4, 5 and 7 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 of U.S. Patent No. 6,667,434 in view of JP '791, Green, Brandhorst and Spitzer.

A Terminal Disclaimer in compliance with 37 CFR § 1.321(c) is filed concurrently herewith to obviate the double patenting rejections. Accordingly, withdrawal of the double patenting rejections is respectfully requested.

Conclusion

For all of the above reasons, it is respectfully submitted that the claims now pending patentability distinguish the present invention from the cited references. Accordingly, reconsideration and withdrawal of the outstanding rejections and an issuance of a Notice of Allowance are earnestly solicited.

Should the Examiner determine that any further action is necessary to place this application into better form, the Examiner is requested to contact the undersigned representative at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants hereby petition for an appropriate extension of time. The Commissioner is hereby authorized to charge any fee deficiency or credit any overpayment associated with this communication to Deposit Account No. 01-2300, referencing docket no. 107336-00018.

Respectfully submitted,

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Enclosures: Terminal Disclaimer
Petition for Extension of Time